

## THE SUMMER WHITING FISHERY IN SOUTHEAST QUEENSLAND.

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The summer whiting (*Sillago ciliata* and *S. analis*) catch from 12 recreational fishing clubs in SE Queensland and the whiting (all species) catch of the commercial fisheries between Caloundra and Southport is assessed. Five popular summer whiting fishing locations (Inskip Point, Bribie and Moreton Islands, Jumpinpin and Southport) were chosen to determine if changes in the yearly mean weight (YMW) and yearly mean catch per person per day (YMC) of summer whiting caught by club recreational fishers had occurred from August to February, 1959 to 1991. It is hypothesised that the summer whiting fisheries are stable at these locations except at Bribie Island where it is declining. □ *Sillago ciliata*, *S. analis*, whiting, catchrates, southeast Queensland.

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*Sillago ciliata* (Sand whiting) and *S. analis* (Golden-lined whiting) (Sillaginidae) both have the common name 'summer whiting'. *S. ciliata* is found along the east coast from Cape York to eastern Victoria and along the east coast of Tasmania (McKay, 1985). *S. analis* occurs across northern Australia from Shark Bay, W.A. to Moreton Bay and along the east coast of New Guinea (McKay, 1985).

*S. ciliata* grows to a maximum length of 51cm, while *S. analis* grows to a maximum length of 45cm (McKay, 1992). Anecdotal evidence (Grant, 1987; Davis, pers. comm.; Tebbutt, pers. comm.) suggests that *S. ciliata* grows to a larger mean size and weight than *S. analis* in SE Queensland. The minimum legal size of summer whiting for all fishers is 23cm total length.

Southeast Queensland has many popular recreational fishing locations for summer whiting. Club anglers and others targeting summer whiting commonly fish from Inskip Point to the south of Tin Can Bay, Bribie Island in the NW part of Moreton Bay, Moreton Island to the E of Brisbane, Jumpinpin to the S of North Stradbroke Island and Southport to the S of South Stradbroke Island. Inskip Point and Bribie Island are considered to be primarily summer whiting fisheries while Moreton Island, Jumpinpin and Southport have mixed fisheries with catches of bream (Sparidae), summer whiting and flathead (Platycephalidae). A tag and release study by Morton (1982) showed that spawning *S. ciliata* rarely move more than 5km from the initial point of capture during August to February. Pollock & Williams (1983) in a study of the recreational summer whiting fishery at the southern end of

Bribie Island and Moreton Island, hypothesised that this lack of movement continued throughout the year with the population on Bribie Island remaining separate from the population on Moreton Island. Their study concluded that at both locations yearly CPUE (fish per person per day) had increased. They concluded that this rise was probably due to improvements in angling equipment and techniques. The study found no evidence of change in mean weight of summer whiting at Moreton Island. They found that the mean weight of summer whiting had declined at Bribie Island concluding that the decline was due to a rise in fishing pressure.

In 1992, commercial fishermen, netting from ocean and inside beaches between Bribie Island and Southport (Queensland), caught c. 30 tonnes of whiting (all species) between August 1992 and February 1993 (Queensland Fisheries Information System (SUNFISH)). A creel survey of recreational angler catches by Morton (1982) showed that *S. ciliata* account for c.97% and *S. analis* c.1% of the catch on Bribie Island. Pollock & Williams (1983) stated that *S. ciliata* was the only whiting caught on Moreton Island. No study has determined the species composition of the recreational catch at Inskip Point, Jumpinpin or Southport or the commercial catch in the study area. But as the commercial net and recreational fishers fish the same areas, their catches should be similar. Morton's (1982) creel survey suggests therefore that the bulk of the net fishers whiting catch will be summer whiting.

Only a few studies acknowledge that recreational fisheries have just as important an effect on a population of fish as the commercial fishery

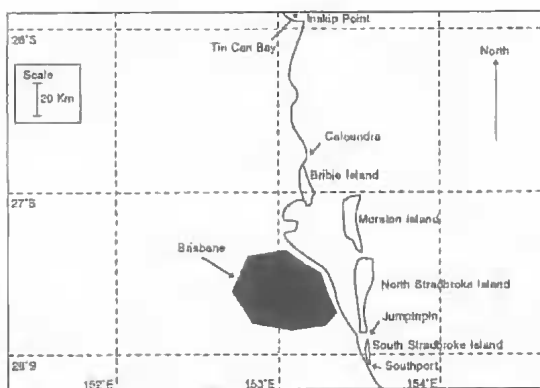


FIG. 1. Locality map.

(e.g. Pollock, 1979; Quinn & Pollock, 1992). This study will utilise the summer whiting catch records of 12 recreational clubs and historical catches of all whiting species by the commercial fisheries in an attempt to gauge the 'health' of the summer whiting fisheries in SE Queensland. Recreational fishing data allow determination of the mean weight of summer whiting. Commercial whiting catches from Caloundra to Southport will be analysed with emphasis on the net fishery from 1988–1991.

METHODS

SOURCES OF DATA

Recreational fishing clubs provided individual fisher catch records from competitions. Data were entered into a database where for each fisher the date, location, numbers of each species caught (e.g. whiting, bream, flathead - catch records do not differentiate between the individual species of whiting) and total weight of catch were recorded.

Commercial fishing records came from: The Fish Board (1959–1972), Queensland Fish Board (1973–1981) and the SUNFISH database (1988–1991). No data were available for 1982–1987. Fish Board and Queensland Fish Board data have been criticised for their reliability (Grey & Spencer, 1986). However they are the only data available for this period and should be viewed as indicative of the level of catch.

STUDY LOCATIONS

Five popular recreational fishing locations chosen were: Inskip Point, southern Bribie Island, Moreton Island, Jumpinpin and Southport (Fig. 1). Commercial fisheries data were for whiting (all species) between Caloundra and Southport (Fig. 1). Commercial trawl data for 1988–1991 were limited to Moreton Bay to remove data collected about the stout whiting

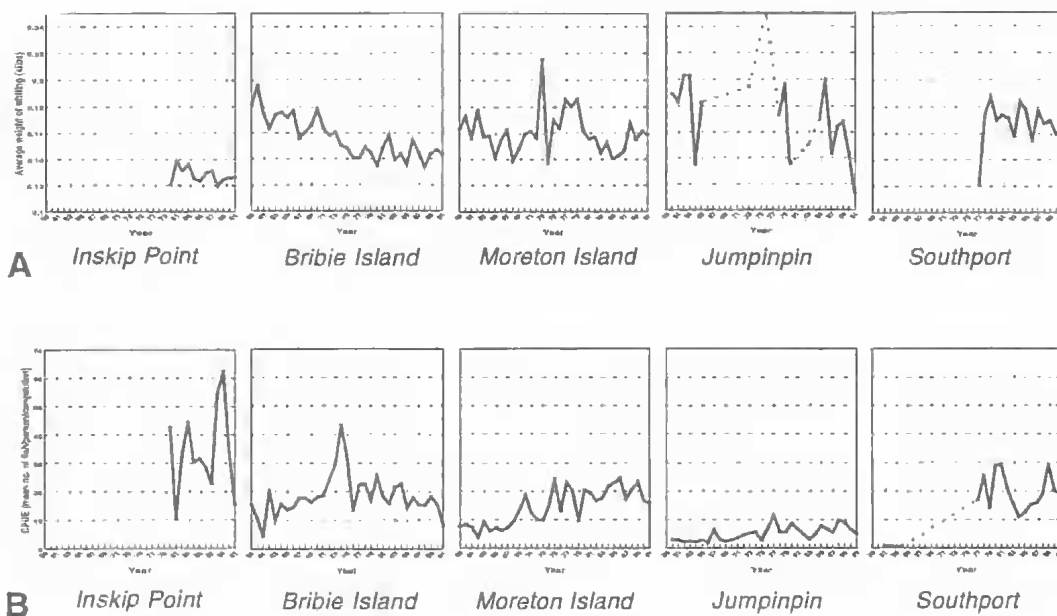


FIG. 2. A, Yearly mean weight (YMW); B, Yearly mean catch (YMC), at each location.

TABLE 1. Results of the linear regression analysis on the YMW of summer whiting.

	Period (n)	R <sup>2</sup>	Signif. level
Inskip Pt	80-91 (12)	0.0328	0.2684
Bribie Is	59-91 (33)	0.6844	0.0000
Bribie Is	72-91 (20)	0.1234	0.0713
Moreton Is	59-91 (33)	-0.0210	0.5625
Jumpinpin	60-91 (19)	0.1327	0.0695
Southport	77-91 (15)	-0.0659	0.3106

fishery which started operations in the early nineties and operates outside the areas traditionally trawled for prawns.

#### LENGTH OF CLUB COMPETITIONS

Recreational fishing competitions lasted for less than 24 hours in all cases. Competitions were held at night for all locations except Bribie Island and Inskip Point where the competitions were held during the day. Night time competitions last 12–15 hours, daylight competitions 8–10 hours.

#### CALCULATION OF YEARLY MEAN WEIGHT AND YEARLY MEAN CATCH

Yearly mean weight (YMW) of fish caught at each location was calculated by dividing the total weight of summer whiting caught by fishers in each year by the total number of summer whiting caught by fishers that year. The only whiting records used in the YMW calculation were those where both the number of fish and weight of whiting caught were recorded. The yearly mean catch (YMC) at each of the locations was calculated as the mean of the number of fish caught per fisher per day (CPUE).

#### TIME FOR THE STUDY

August to February, 1959–1991; total yearly commercial catch of whiting (all species) for 1959–1991, except for 1982–1987 where no data were available, was analysed as total monthly catches were not available for most years.

TABLE 2. YMW at each location.

	Period	Av. YMW (kg)	St. dev.	Min weight (kg)	Max. weight (kg)
Inskip	80-91	0.128	±0.006	0.120	0.139
Bribie	70-91	0.146	±0.008	0.134	0.161
Moreton	59-91	0.160	±0.016	0.137	0.216
Jump'pin	59-91	0.174	±0.015	0.113	0.250
S'port.	77-91	0.167	±0.15	0.121	0.187

#### SAMPLE SIZES

Sample sizes in each year for the calculation of YMW at Inskip Point, Bribie Island and Moreton Island were above 1000 fish. At Jumpinpin and Southport the sample sizes in each year averaged 60 and 600 fish per year respectively with the lowest sample size being 17 fish at Jumpinpin in 1964. Sample sizes for the calculation of YMC averaged above 150 angler days per year at Bribie Island and Moreton Island. Sample sizes at the other 3 locations averaged 40–75 angler days per year with the minimum sample size being 10 angler days at Jumpinpin in 1980.

#### STATISTICAL ANALYSIS

Linear regressions on YMW and YMC at each location and on commercial whiting catch used Statistix, version 4, by Analytical Software (1992).

## RESULTS

#### YEARLY MEAN WEIGHT (YMW) OF SUMMER WHITING CAUGHT BY RECREATIONAL ANGLERS (Fig. 2A)

There is no significant trend in YMW at Southport, Jumpinpin, Moreton Island or Inskip Point whereas it has declined significantly at Bribie Island (Table 1). However there has been no significant trend in YMW at Bribie Island since the early 1970s (Table 1) from which time YMW has averaged  $c.0.146 \pm 0.008$  kg/fish (Table 2).

#### YEARLY MEAN CATCH (YMC) OF SUMMER WHITING CAUGHT BY RECREATIONAL ANGLERS (Fig. 2B)

There is no recognisable trend in YMC at Inskip Point (Table 3). At Bribie Island YMC increased from 1959–1974 then decreased 1975–1991 (Table 3) by  $c.10$  fish/person/day. At

TABLE 3. Results of the linear regression analysis on the YMC of summer whiting.

	Period (n)	R <sup>2</sup>	Signif. level
Inskip	80-91 (12)	0.3934	0.0032
Bribie	59-74 (16)	0.5255	0.0009
Bribie	75-91 (17)	0.3217	0.0103
Moreton	59-91 (33)	0.5842	0.0000
Moreton	70-91 (22)	0.1238	0.0602
Jump'pin	59-91 (30)	0.4118	0.001
Jump'pin	70-91 (20)	0.0979	0.9720
S'port	61-91 (18)	0.3934	0.0032
S'port	77-91 (15)	-0.0659	0.7196

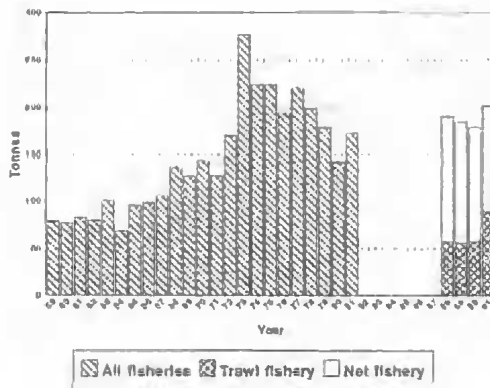


FIG. 3. Yearly commercial catch of whiting (all species) from Caloundra to Southport.

Moreton Island and Jumpinpin there was an overall increase (Table 3) up to 1970 after which it has been stable. At Southport there was an increase (Table 3) from 1959–1991 with no change from 1977–1991. Data are not available for catches at Southport from 1965–1976.

#### YEARLY COMMERCIAL WHITING CATCHES

The total whiting catch for the commercial fisheries (Fig. 3) shows a significant rise in yearly whiting (all species) catch from 1959–1991 (R-squared 0.4633, Significance level 0.000). However since the early 1970s there has been no significant change in total commercial catch. The commercial catch (1971–1991) averaged c.150 tonnes (min. 142 tonnes in 1980, max. 277 tonnes in 1973).

Catch data for the net fishery 1988–1991 (Table 5) show no significant change in number of days fished or CPUE (kg/day/boat). A decline in the total catch of whiting in the net fishery occurred between 1988–1991 with a yearly decline in catch of around 6%.

TABLE 4. YMC at each location.

	Period	Mean YMC	St. dev.	Min. YMC	Max. YMC
Inskip	80-91	34.3	± 14.4	10.4	62.4
Bribie	75-91	18.7	± 5.3	8.3	32.14
Moreton	70-91	17.9	± 4.7	9.6	24.6
Jump'pin	70-91	6.2	± 2.3	3	11.6
S'port	77-91	19.1	± 6.15	11	29.5

## DISCUSSION

### SIZE OF SUMMER WHITING

The decline in YMW at Bribie Island from 1959–1972 was observed by Pollock & Williams (1983) but our analysis shows this ceased in 1972. The YMW of summer whiting on Bribie Island stabilised in 1972 at  $0.146 \pm 0.008$  kg/fish. Possible causes for the decline from 1959–1972 are: 1, increased fishing pressure due to increased number of anglers; 2, increased fishing pressure due to improvements in angling techniques and equipment; 3, population decline of summer whiting due to loss or modification of habitat; 4, natural decline in the population of summer whiting due to weather effects such as fresh water runoff; 5, higher percentage of *S. analis* in the catch, which has a smaller mean weight than *S. ciliata* (Grant, 1987; Davis, pers. comm.; Tebbutt pers. comm.).

Possibility (1) is supported by the opening of the Bribie Island bridge in October 1963. Pollock & Williams (1983) reported improvements in angling techniques and equipment with fishing

TABLE 5. Catch data of the net fishery from Caloundra to Southport.

Year	Days fished	CPUE (kg/day)	Whiting catch (kg)
1988	6591	20	133266
1989	6418	19	127980
1990	6219	19	121669
1991	6887	16	112354

trips corresponding to favourable tides and the standardisation of light angling gear and bait. This supports (2). (3) is supported by Hyland & Butler (1989) and Hyland et al. (1989) who show natural and human modification to habitats around Bribie Island over the study period. There is no evidence to prove or disprove (4). (5) is unlikely because a creel survey in November 1980 at Bribie Island by Morton (1982) indicated that *S. ciliata* made up 97% of the catch and for the same year the YMW at Bribie Island was one of the lowest for 33 years at 0.135 kg/fish. It is hypothesised that this decline is an actual decline in the mean weight of legally sized *S. ciliata* caused by a combination of 1-5.

YMW at Jumpinpin from 1971–1991 showed no statistical change. However, graph of YMW at Jumpinpin (Fig. 2) suggests a decline over that period. As data are available for only 13 of the 21 years this is inconclusive.

Average YMW at Inskip Point is lower than at other locations. It is hypothesised that this is due to a higher proportion of *S. analis* in the catch (Grant, 1982). The YMW at Inskip Point, Moreton Island and Southport have remained stable over the study period with variations caused by yearly fluctuations such as weather and tides at the time of club competitions.

#### YMC OF SUMMER WHITING

Morton's (1982) creel survey in 1980 of everyday anglers on Bribie Island found that the average catch per angler was 13 fish in November of that year. We calculate YMC at Bribie Island during 1980 as 25 per angler. Therefore YMC's in this study are larger than the actual CPUE's at each location due to: 1, calculation of YMC from recreational fishing club anglers included only those who caught one or more summer whiting, those who caught none were excluded from the calculation; 2, club anglers possibly having higher CPUE's than non club anglers due to experience.

CPUE is commonly used as an indicator of stock abundance by fisheries biologists (Gulland, 1964; Bannerot & Austin, 1983). Any changes in YMC may therefore indicate changes in summer whiting abundance. In the present study YMC has increased from 1959 to the early seventies at 4 of the 5 study locations (Bribie Island, Moreton Island, Jumpinpin and Southport). It is possible the rise in YMC is due to an increase in stock size but this is unlikely as the YMC has not been standardised for improvements in angling techniques and equipment. No data are available for YMC at Inskip Point until 1980.

YMC increased at Bribie and Moreton Islands, Jumpinpin and Southport from 1959 to the early seventies due to an improvement in angling techniques and equipment, such as the introduction of hollow fibreglass rods and the availability of lighter gear.

The YMC at Bribie Island declined from 1975–1991 due to: 1, a decline in the total number of summer whiting or 2, a decline in the number of legally sized summer whiting with a corresponding increase in the number of undersized summer whiting.

There is no evidence of a decline in YMC at any of the other study locations from the early seventies. As there have been no significant advances in angling techniques and equipment during this time, which would require standardisation of the data, it is likely that the stock levels of summer whiting have remained stable at

these locations over the 20 year period. Because Inskip Point and Bribie Island are considered to be summer whiting fisheries their YMCs should be higher than others. YMC is highest at Inskip Point. The YMC's at Bribie Island, Moreton Island and Southport are similar but lower than the YMC at Inskip Point. The YMC at Jumpinpin is much lower than at any of the other four locations (Table 4).

The YMC at Bribie Island is the same as at Moreton Island and Southport because: 1, the population of legally sized summer whiting at Bribie Island has declined; or 2, the length of the club competitions were longer at Moreton Island and Southport (12–15hrs) than at Bribie Island (8–10hrs).

#### COMMERCIAL CATCH OF WHITING

Reliability of commercial catch data prior to 1981 has been validly questioned (Gray & Spencer, 1986) but they remain the only available information and are indicative of the level of catch. Catches for the commercial net and trawl fisheries cannot be separated prior to 1981 so it is not certain why a significant increase occurred up to 1973, although the most likely reasons are the expansion of the commercial fisheries in terms of number of commercial fishers and the areas fished and advances in the types of gear used.

After 1988 they are separated into net and trawl catches. The whiting catch of the net fishery is considered to consist of summer whiting as this is the most common whiting caught by recreational fishers who fish the same areas as the commercial fishers. A significant decrease of the total whiting catch in the net fishery of c.6% per year has occurred from 1988–1991. This decline can be explained to a degree by a decline in the total number of days on which net fishers caught whiting (Table 5). However this does not explain the drop in total catch in 1991 when almost 6,900 days of fishing were reported, the greatest number of days fished in the four year period.

As the CPUE of whiting has remained fairly constant from 1988–1991 (Table 5) those whiting stocks utilised by net fishers in the Moreton Bay region are probably stable.

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